

We Claim:

1. In a curable composition for use during microlithographic processes, said composition comprising a polymer binder dissolved in a solvent system, the improvement which comprises a non-aromatic, light attenuating compound which absorbs light at wavelengths of less than about 300 nm in said composition, said light attenuating compound comprising:

carbon atoms C<sub>1</sub> and C<sub>2</sub> double-bonded to one another and carbon atoms

C<sub>3</sub> and C<sub>4</sub> double-bonded to one another and wherein C<sub>3</sub> is

bonded to C<sub>2</sub> so as to form conjugated double bonds;

an EWG bonded to carbon atom C<sub>1</sub>; and

an EDG bonded to carbon atom C<sub>4</sub>, said EDG including a moiety

selected from the group consisting of H<sub>3</sub>CO, OH, and R<sub>1</sub>-O-,

wherein R<sub>1</sub> is non-aromatic and is selected from the group

consisting of hydrogen, acyclic and cyclic alkyls, and

heteroalkyls.

2. The composition of claim 1, wherein said light attenuating compound is bonded to the polymer binder.

3. The composition of claim 1, wherein the polymer binder comprises a backbone, and said light attenuating compound is bonded to said backbone.

4. The composition of claim 1, wherein said light attenuating compound is bonded to a linkage unit and said linkage unit is bonded to the polymer binder.

5. The composition of claim 4, wherein said linkage unit comprises a moiety selected from the group consisting of cyclic alkyls, acyclic alkyls, acyclic heteroalkyls, and cyclic heteroalkyls.

6. The composition of claim 1, wherein said light attenuating compound includes a moiety selected from the group consisting of COOH, OH, CONH<sub>2</sub>, CONHR', CH<sub>2</sub>X, and mixtures thereof, wherein R' is selected from the group consisting of hydrogen, alkyls, and heteroalkyls, and wherein X is a halogen.

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7. The composition of claim 1, wherein after curing, said composition has an etch rate of at least about 4000 Å/minute when utilizing an etchant gas comprising a mixture of HBr and O<sub>2</sub>.

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8. The composition of claim 1, wherein the EWG includes a moiety selected from the group consisting of carbonyl, carboxyl, carboxamido, sulfonyl, and non-aromatic heterocyclic groups.

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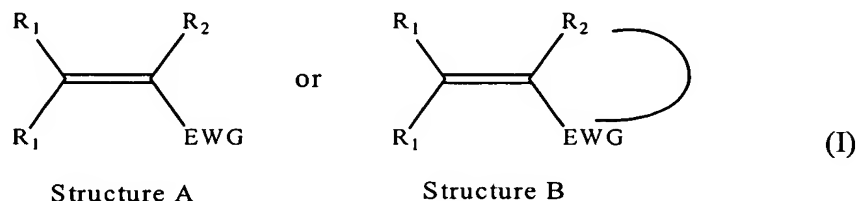
9. The composition of claim 1, further including a second EWG, said second EWG being bonded to C<sub>4</sub>.

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10. The composition of claim 9, wherein the second EWG includes a moiety selected from the group consisting of carbonyl, carboxyl, carboxamido, sulfonyl, and non-aromatic heterocyclic groups.

11. In a composition for use during microlithographic processes, said composition comprising a polymer binder dissolved in a solvent system, the improvement which comprises a non-aromatic, light attenuating compound comprising a moiety selected from the group consisting of:

(a)



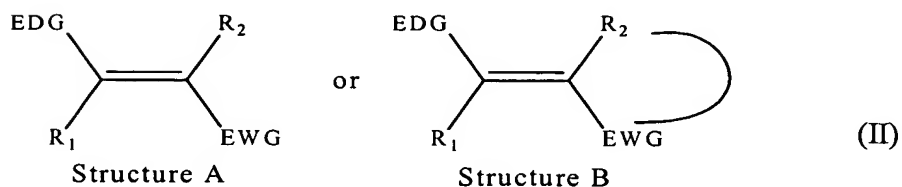
where:

- each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:
 

EWG is a non-aromatic electron-withdrawing group;

and

$R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; and
- in structure B, where EWG and  $R_2$  form a cyclic electron-withdrawing unit, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;



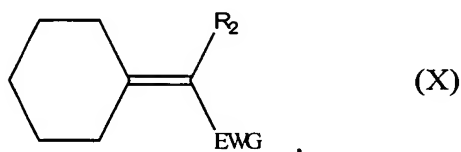
where:

- $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- EDG is an electron-donating group;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:

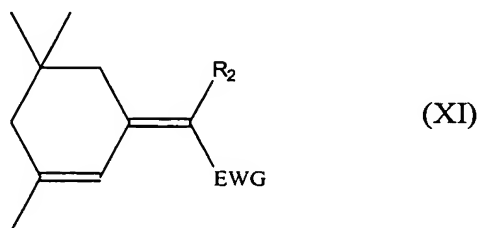
EWG is a non-aromatic electron-withdrawing group;  
and

$R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; and

- in structure B, where EWG and  $R_2$  form a cyclic electron-withdrawing unit, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;



where:  $R_2$  is non-aromatic and is individually hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group;  
and EWG is a non-aromatic electron-withdrawing group; and



where:  $R_2$  is non-aromatic and is individually hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; and EWG is a non-aromatic electron-withdrawing group;

- 5           (b)     olefinic moieties of (I), (II), and mixtures thereof; and  
          (c)     mixtures of (a) and (b),

wherein at least one of  $R_1$  and  $R_2$  of said light attenuating compound is bonded to the polymer binder.

10           12.     The composition of claim 11, wherein the EWG of said light attenuating compound is bonded to the polymer binder.

15           13.     The composition of claim 11, wherein the polymer binder comprises a backbone, and said light attenuating compound is bonded to said backbone.

          14.     The composition of claim 13, wherein the EWG of said light attenuating compound is bonded to said backbone.

20           15.     The composition of claim 11, wherein said light attenuating compound is bonded to a linkage unit and said linkage unit is bonded to the polymer binder.

25           16.     The composition of claim 15, wherein said linkage unit comprises a moiety selected from the group consisting of cyclic alkyls, acyclic alkyls, acyclic heteroalkyls, and cyclic heteroalkyls.

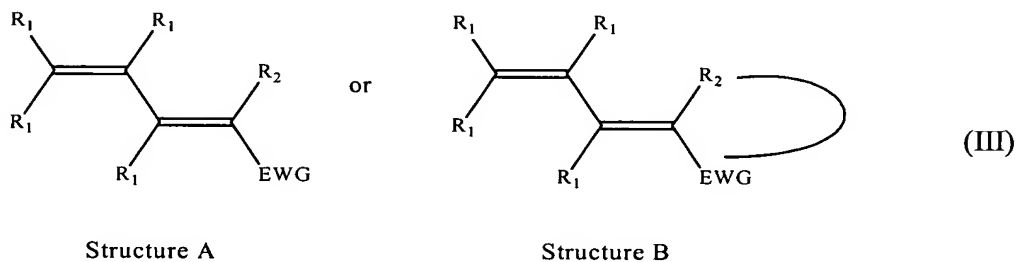
          17.     The composition of claim 11, wherein the EWG of said light attenuating compound is selected from the group consisting of carbonyl, cyano, carboxyl, carboxamido, sulfonyl, and non-aromatic heterocyclic groups.

18. The composition of claim 11, wherein each of  $R_1$  and  $R_2$  of said light attenuating compound is individually selected from the group consisting of hydrogen, alkyls, and heteroalkyls.

19. The composition of claim 11, wherein said light attenuating compound comprises a moiety selected from the group consisting of  $\text{COOH}$ ,  $\text{OH}$ ,  $\text{CONH}_2$ ,  $\text{CONHR}'$ ,  $\text{CH}_2\text{X}$ , and mixtures thereof, wherein each  $R'$  is individually selected from the group consisting of hydrogen, alkyls, and heteroalkyls, and wherein  $X$  is a halogen.

20. In a composition for use during microlithographic processes, said composition comprising a polymer binder dissolved in a solvent system, the improvement which comprises a non-aromatic, light attenuating compound comprising a moiety selected from the group consisting of:

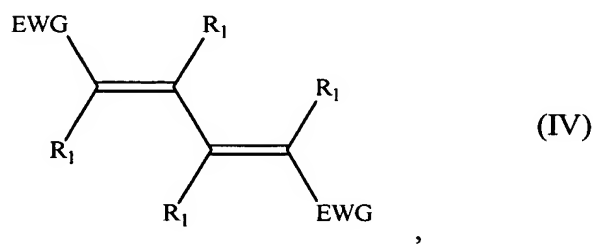
(a)



where:

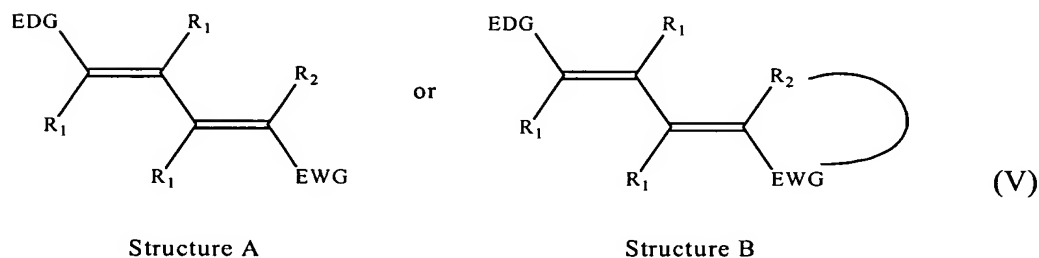
- each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:  
EWG is a non-aromatic electron-withdrawing group;  
and  
 $R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group;

- in structure B, where EWG and R<sub>2</sub> form a cyclic electron-withdrawing unit, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;



where:

- each R<sub>1</sub> is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl; and
- EWG is a non-aromatic electron-withdrawing group;



Structure A

Structure B

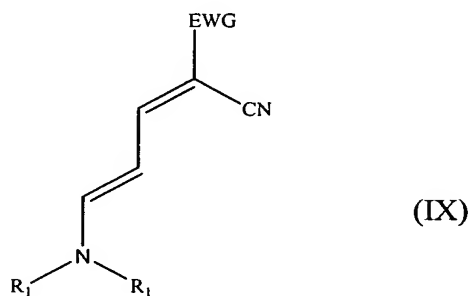
where:

- each R<sub>1</sub> is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- EDG is an electron-donating group;
- in structure A, where EWG and R<sub>2</sub> do not form a cyclic unit:

EWG is a non-aromatic electron-withdrawing group

other than cyano groups, and  $R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; or EWG is a cyano group, and  $R_2$  is non-aromatic and is hydrogen, or an acyclic or cyclic alkyl or heteroalkyl; and

- in structure B, where EWG and  $R_2$  form a cyclic electron-withdrawing unit, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;



where EWG is a non-aromatic electron-withdrawing group;

- (b) diolefinic moieties of (III), (IV), (V), and mixtures thereof; and
- (c) mixtures of (a) and (b),

wherein at least one of  $R_1$  and  $R_2$  of said light attenuating compound is bonded to the polymer binder.

21. The composition of claim 20, wherein the polymer binder comprises a backbone, and said light attenuating compound is bonded to said backbone.



22. The composition of claim 20, wherein said light attenuating compound is bonded to a linkage unit and said linkage unit is bonded to the polymer binder.

23. The composition of claim 22, wherein said linkage unit comprises a moiety selected from the group consisting of cyclic alkyls, acyclic alkyls, acyclic heteroalkyls, and cyclic heteroalkyls.

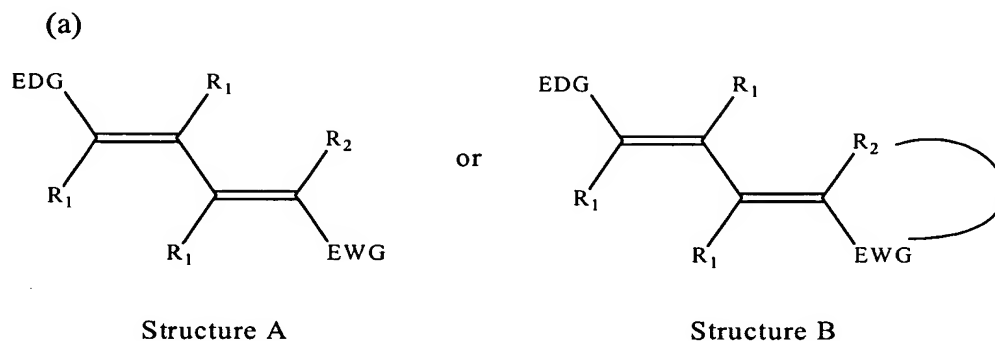
24. The composition of claim 20, wherein the EWG of said light attenuating compound is selected from the group consisting of carbonyl, cyano, carboxyl, carboxamido, sulfonyl, and non-aromatic heterocyclic groups.

25. The composition of claim 20, wherein each of  $R_1$  and  $R_2$  of said light attenuating compound is individually selected from the group consisting of hydrogen, alkyls, and heteroalkyls.

26. The composition of claim 25, wherein each of  $R_1$  and  $R_2$  of said light attenuating compound is individually selected from the group consisting of cyclic alkyls and acyclic alkyls.

27. The composition of claim 20, wherein said light attenuating compound comprises a moiety selected from the group consisting of  $\text{COOH}$ ,  $\text{OH}$ ,  $\text{CONH}_2$ ,  $\text{CONHR}'$ ,  $\text{CH}_2\text{X}$ , and mixtures thereof, wherein  $R'$  is individually selected from the group consisting of hydrogen, alkyls, and heteroalkyls, and wherein  $X$  is a halogen.

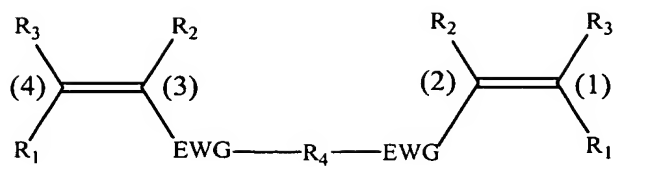
28. A composition useful for absorbing light comprising a compound including a structural formula selected from the group consisting of compounds of:



where:

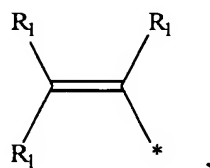
- each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- EDG is an electron-donating group, where each of  $R_x$  and  $R_y$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:  
 EWG is a non-aromatic electron-withdrawing group other than cyano groups, and  $R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; or  
 EWG is a cyano group, and  $R_2$  is non-aromatic and is hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- in structure B, where EWG and  $R_2$  form a cyclic electron-withdrawing unit, the cyclic unit comprises a  $C=O$ ,  $C=S$ , or a  $C=N$  at a first carbon atom, and: a  $C=O$  or a  $C=N$  attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;

(b)



where:

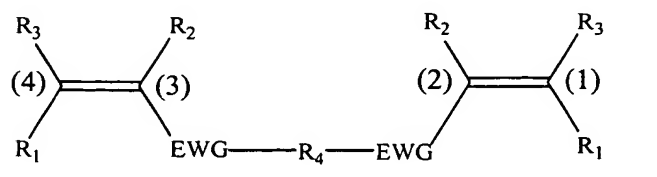
- each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- each  $R_3$  is individually  $R_1$  or



where each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl, and where the (\*) represents the double-bonded carbon atom (1) or (4);

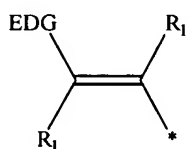
- each EWG is a non-aromatic electron-withdrawing group;
- each  $R_2$  is non-aromatic and is individually hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group;
- $R_4$  is a divalent, non-aromatic-containing bridging group; and
- (1)-(4) refer to the respective double-bonded carbon atoms;

(c)



where:

- each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- each  $R_2$  is non-aromatic and is individually hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group;
- each  $R_3$  is individually an EDG, or



where each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl; EDG is an electron-donating; and where the (\*) represents the double-bonded carbon atom (1) or (4);

- $R_4$  is a divalent, non-aromatic-containing bridging group;
- each EWG is a non-aromatic electron-withdrawing group; and
- (1) - (4) refer to the respective double-bonded carbon atoms;

- in structure A where  $R_3$  is an EWG or structure C:
  - each EWG is a non-aromatic electron-withdrawing group other than cyano groups, and each  $R_2$  is non-aromatic and is individually hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; or
    - EWG is a cyano group, and each  $R_2$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- in structure B and in structure A where  $R_3$  is structure D, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from

the first carbon atom; and

- each EDG is an electron-donating group;
- $R_4$  is a divalent, non-aromatic-containing bridging group; and
- (1) - (4) refer to the respective double-bonded carbon atoms.

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29. The composition of claim 28, wherein each EWG comprises a group individually selected from the group consisting of carbonyl, cyano, carboxyl, carboxamido, sulfonyl, and non-aromatic heterocyclic groups.

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30. The composition of claim 28, wherein each  $R_1$  and  $R_2$  comprises a group individually selected from the group consisting of hydrogen, alkyls, and heteroalkyls.

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31. The composition of claim 30, wherein each  $R_1$  and  $R_2$  comprises a group individually selected from the group consisting of non-aromatic cyclic alkyls and acyclic alkyls.

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32. The composition of claim 30, wherein each  $R_1$  and  $R_2$  comprises a group individually selected from the group consisting of conjugated alkyls and conjugated heteroalkyls.

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33. The composition of claim 28, wherein each EDG comprises a group individually selected from the group consisting of  $H_3CO$ ,  $OH$ , and  $R_1-O-$ , wherein  $R_1$  is non-aromatic and is selected from the group consisting of hydrogen, acyclic and cyclic alkyls, and heteroalkyls.

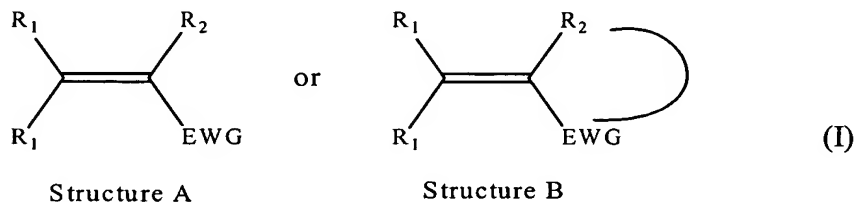
34. In a curable composition for use during microlithographic processes, said composition comprising a polymer binder dissolved in a solvent system, the improvement which comprises a non-aromatic, light attenuating compound which absorbs light at wavelengths of less than about 300 nm in said composition, said light attenuating compound comprising:

carbon atoms C<sub>1</sub> and C<sub>2</sub> double-bonded to one another and carbon atoms C<sub>3</sub> and C<sub>4</sub> double-bonded to one another and wherein C<sub>3</sub> is bonded to C<sub>2</sub> so as to form conjugated double bonds;  
an EWG bonded to carbon atom C<sub>1</sub>;  
an EDG bonded to carbon atom C<sub>4</sub>; and  
a second EWG bonded to carbon atom C<sub>4</sub>.

35. The composition of claim 34, wherein the second EWG includes a moiety selected from the group consisting of carbonyl, carboxyl, carboxamido, sulfonyl, and non-aromatic heterocyclic groups.

36. In a composition for use during microlithographic processes, said composition comprising a polymer binder dissolved in a solvent system, the improvement which comprises a non-aromatic, light attenuating compound comprising a moiety selected from the group consisting of:

(a)



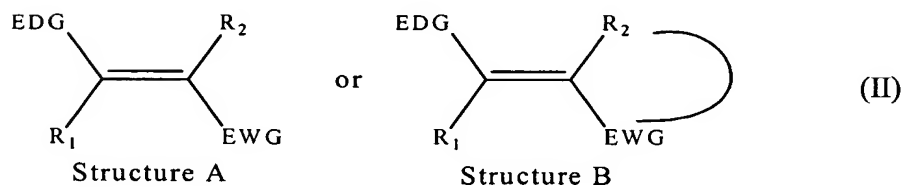
where:

- each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:

EWG is a non-aromatic electron-withdrawing group;  
and

$R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; and

- in structure B, where EWG and  $R_2$  form a cyclic electron-withdrawing unit, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;





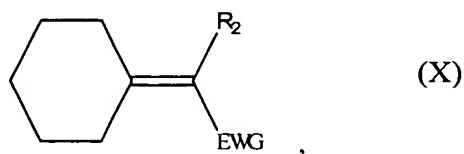
where:

- $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- EDG is an electron-donating group;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:

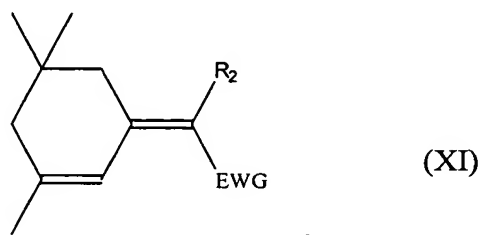
EWG is a non-aromatic electron-withdrawing group;  
and

$R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; and

- in structure B, where EWG and  $R_2$  form a cyclic electron-withdrawing unit, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;



where:  $R_2$  is non-aromatic and is individually hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; and EWG is a non-aromatic electron-withdrawing group; and



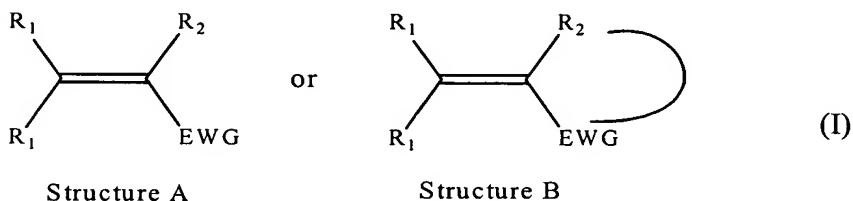
where:  $R_2$  is non-aromatic and is individually hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; and EWG is a non-aromatic electron-withdrawing group;

- (b) olefinic moieties of (I), (II), and mixtures thereof; and  
 (c) mixtures of (a) and (b),

wherein said polymer binder comprises a backbone, and at least one of  $R_1$  and  $R_2$  of said light attenuating compound is bonded to the polymer binder backbone.

37. In a composition for use during microlithographic processes, said composition comprising a polymer binder dissolved in a solvent system, the improvement which comprises a non-aromatic, light attenuating compound comprising a moiety selected from the group consisting of:

(a)



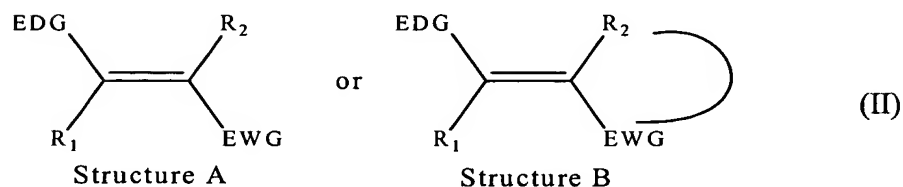
where:

- each  $R_1$  is non-aromatic and is individually selected from the group consisting of cyclic alkyls and acyclic alkyls;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:

EWG is a non-aromatic electron-withdrawing group;  
 and

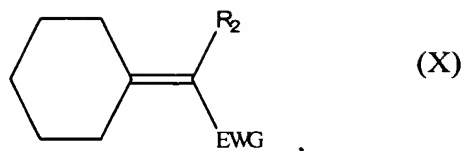
$R_2$  is non-aromatic and is individually selected from the group consisting of cyclic alkyls and acyclic alkyls; and

- in structure B, where EWG and R<sub>2</sub> form a cyclic electron-withdrawing unit, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;

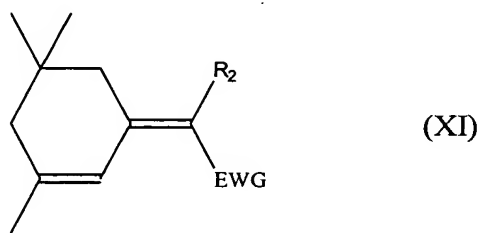


where:

- R<sub>1</sub> is non-aromatic and is individually selected from the group consisting of cyclic alkyls and acyclic alkyls;
- EDG is an electron-donating group;
- in structure A, where EWG and R<sub>2</sub> do not form a cyclic unit:  
     EWG is a non-aromatic electron-withdrawing group;  
     and  
     R<sub>2</sub> is non-aromatic and is individually selected from the group consisting of cyclic alkyls and acyclic alkyls; and
- in structure B, where EWG and R<sub>2</sub> form a cyclic electron-withdrawing unit, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;



where:  $R_2$  is non-aromatic and is individually selected from the group consisting of cyclic alkyls and acyclic alkyls; and EWG is a non-aromatic electron-withdrawing group; and

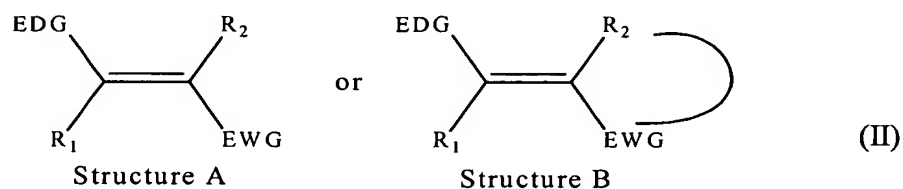


where:  $R_2$  is non-aromatic and is individually selected from the group consisting of cyclic alkyls and acyclic alkyls; and EWG is a non-aromatic electron-withdrawing group;

- (b) olefinic moieties of (I), (II), and mixtures thereof; and
- (c) mixtures of (a) and (b).

38. In a composition for use during microlithographic processes, said composition comprising a polymer binder dissolved in a solvent system, the improvement which comprises a non-aromatic, light attenuating compound comprising a moiety selected from the group consisting of:

(a)



where:

- $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- EDG is an electron-donating group and comprises a group selected from the group consisting of  $H_3CO$ ,  $OH$ ,  $R_1-O-$ , and  $R_xR_yN$  groups, wherein each of  $R_x$  and  $R_y$  being non-aromatic and individually selected from the group consisting of hydrogen, alkyls, and heteroalkyls;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:
 

EWG is a non-aromatic electron-withdrawing group;

and

$R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; and
- in structure B, where EWG and  $R_2$  form a cyclic electron-withdrawing unit, the cyclic unit comprises a  $C=O$ ,  $C=S$ , or a  $C=N$  at a first carbon atom, and: a  $C=O$  or a  $C=N$  attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least

two positions away from the first carbon atom;

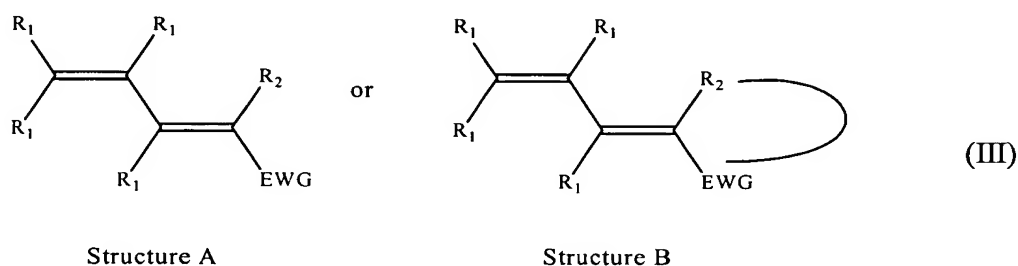
- (b) olefinic moieties of (II); and
- (c) mixtures of (a) and (b).

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39. In a composition for use during microlithographic processes, said composition comprising a polymer binder dissolved in a solvent system, the improvement which comprises a non-aromatic, light attenuating compound comprising a moiety selected from the group consisting of:

10

(a)



15

where:

20

- each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:

EWG is a non-aromatic electron-withdrawing group;  
and

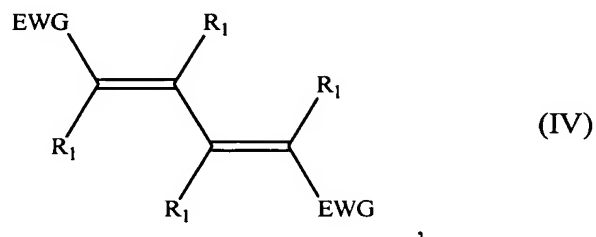
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$R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group;

- in structure B, where EWG and  $R_2$  form a cyclic electron-withdrawing unit, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first

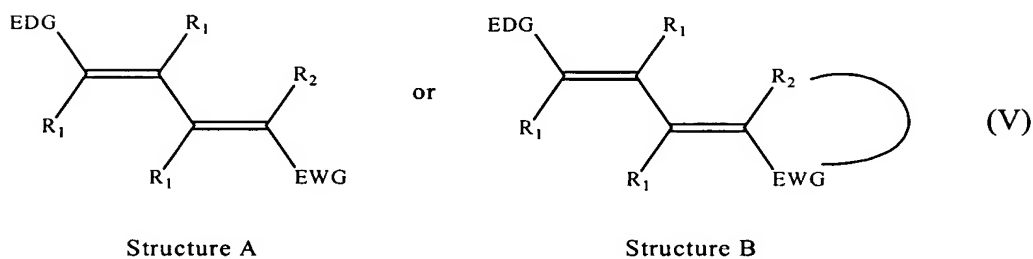
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carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;



10 where:

- each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl; and
- EWG is a non-aromatic electron-withdrawing group;



20 where:

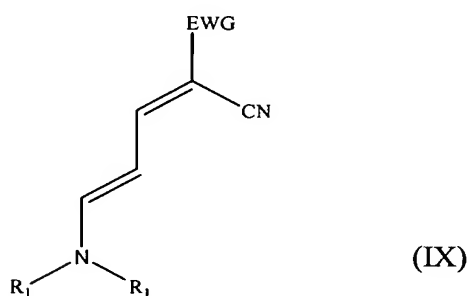
- each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- EDG is an electron-donating group;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:

25 EWG is a non-aromatic electron-withdrawing group other than cyano groups, and  $R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; or

30

EWG is a cyano group, and  $R_2$  is non-aromatic and is hydrogen, or an acyclic or cyclic alkyl or heteroalkyl; and

- in structure B, where EWG and  $R_2$  form a cyclic electron-withdrawing unit, the cyclic unit comprises a C=O, C=S, or a C=N at a first carbon atom, and: a C=O or a C=N attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least two positions away from the first carbon atom;



where EWG is a non-aromatic electron-withdrawing group;

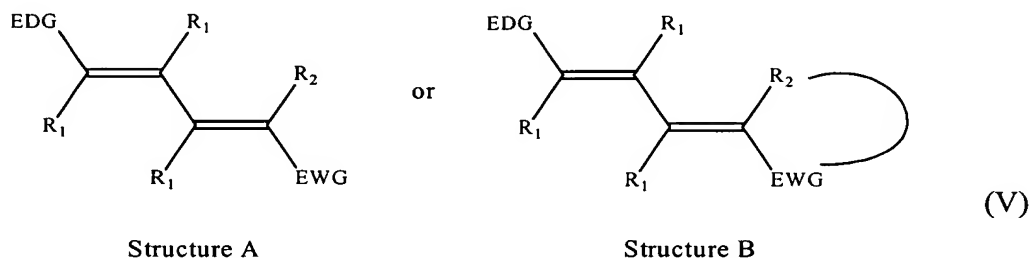
- (b) diolefinic moieties of (III), (IV), (V), and mixtures thereof; and
- (c) mixtures of (a) and (b),

wherein said polymer binder comprises a backbone, and at least one of  $R_1$  and  $R_2$  of said light attenuating compound is bonded to the polymer binder backbone.



40. In a composition for use during microlithographic processes, said composition comprising a polymer binder dissolved in a solvent system, the improvement which comprises a non-aromatic, light attenuating compound comprising a moiety selected from the group consisting of:

(a)



where:

- each  $R_1$  is non-aromatic and is individually hydrogen, or an acyclic or cyclic alkyl or heteroalkyl;
- EDG is an electron-donating group and comprises a group selected from the group consisting of  $H_3CO$ ,  $OH$ ,  $R_1-O-$ , and  $R_xR_yN$  groups and each of  $R_x$  and  $R_y$ ;
- in structure A, where EWG and  $R_2$  do not form a cyclic unit:

EWG is a non-aromatic electron-withdrawing group other than cyano groups, and  $R_2$  is non-aromatic and is hydrogen, an acyclic or cyclic alkyl or heteroalkyl, or an electron-withdrawing group; or

EWG is a cyano group, and  $R_2$  is non-aromatic and is hydrogen, or an acyclic or cyclic alkyl or heteroalkyl; and

- in structure B, where EWG and  $R_2$  form a cyclic electron-withdrawing unit, the cyclic unit comprises a  $C=O$ ,  $C=S$ , or a  $C=N$  at a first carbon atom, and: a  $C=O$  or a  $C=N$  attached to a carbon atom at least two carbon atoms away from the first carbon atom; or an O, S, or N as a member of the ring at least

two positions away from the first carbon atom;

- (b) diolefinic moieties of (V); and
- (c) mixtures of (a) and (b),

5 is non-aromatic and individually selected from the group consisting of hydrogen, alkyls, and heteroalkyls.

10 41. In a composition for use during microlithographic processes, said composition comprising a polymer binder dissolved in a solvent system, the improvement which comprises a non-aromatic, light attenuating compound comprising a moiety of



20 where EWG is a non-aromatic electron-withdrawing group, and EWG is bonded to the polymer binder.

25 42. The composition of claim 41, wherein said EWG is bonded to a linkage unit and said linkage unit is bonded to the polymer binder.

43. A cured fill layer used during microlithographic processes, said layer being formed by curing a composition including:

a polymer binder dissolved in a solvent system;

a non-aromatic, light attenuating compound which absorbs light at wavelengths of less than about 300 nm and comprises a diolefin including:

carbon atoms  $C_1$  and  $C_2$  double-bonded to one another and an EWG bonded to carbon atom  $C_1$ ; and

carbon atoms  $C_3$  and  $C_4$  double-bonded to one another, wherein  $C_3$  is bonded to  $C_2$  so as to form conjugated double bonds; and

a glycouril-formaldehyde cross-linking agent.

44. The combination of:

a substrate for use in microlithographic processes; and

a cured layer adjacent said substrate, said layer being formed by curing a composition including:

a polymer binder dissolved in a solvent system;

a non-aromatic, light attenuating compound which absorbs light at wavelengths of less than about 300 nm and comprises a diolefin including:

carbon atoms  $C_1$  and  $C_2$  double-bonded to one another and an EWG bonded to carbon atom  $C_1$ ; and

carbon atoms  $C_3$  and  $C_4$  double-bonded to one another, wherein  $C_3$  is bonded to  $C_2$  so as to form conjugated double bonds; and

a glycouril-formaldehyde cross-linking agent.